

Remarks

Favorable reconsideration of this application, in view of the above amendments and in light of the following remarks and discussion, is respectfully requested.

Applicants respectfully request entry of this response, as the response places the application in clear condition for allowance or alternatively places the claims in better form for appeal. Specifically, Applicants have amended independent Claim 1 so as to be in condition for allowance.

Upon entry of this response, Claims 1 and 8-10 are currently pending in the application; Claim 1 having been amended, Claims 2-7 having been canceled without prejudice or disclaimer, and Claims 9 and 10 having been added. Applicants respectfully assert that support for the changes to the claims is self-evident from the originally filed disclosure, including the original claims, and that therefore no new matter has been added.¹

In the Office Action, dependent Claim 4 was rejected under 35 U.S.C. § 112, second paragraph. In response, Applicants have canceled dependent Claim 4. Thus, Applicants respectfully request that the rejection of dependent Claim 4 under 35 U.S.C. § 112, second paragraph, be withdrawn. Inasmuch as the rejection of dependent Claim 4 may be applied to the amended and new claims, Applicants respectfully assert that the remaining claims do not recite “nominal.”

In the Office Action, Claims 1, 2, 4, 6, and 8 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,646,445 to Masumoto et al. (Masumoto) in view of the Applicants’ Admitted Prior Art (the Admitted Prior Art) and Japanese Publication No. 7-279109 to Arita et al. (Arita). Claim 3 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Masumoto, the Admitted Prior Art, and Arita, and further in view of

¹ Applicants respectfully assert that support for the changes to the claims is provided, in part, as follows: regarding independent Claim 1, from original dependent Claims 2 and 4; regarding new independent Claim 9, from original independent Claim 1 and dependent Claims 2 and 7; and regarding new dependent Claim 10, from original dependent Claim 8.

Japanese Publication No. 9-55462 to Takegawa. Claims 5 and 7 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Masumoto, the Admitted Prior Art, and Arita, and further in view of U.S. Patent No. 4,018,132 to Abe. Applicants respectfully assert that the above amendments to the claims have overcome the rejections for the following reasons.

The present invention is directed to power semiconductor modules. Independent Claim 1 recites an electrode terminal connected with an electric power semiconductor device which is resin sealed inside of a case at one end while having a hole and exposed along a side of an outer surface of the case at the other end. An electrode plate for external connection has a hole and is arranged to overlie the electrode terminal on the outer surface of the case. A nut is embedded in the outer surface of the case and located adjacent to a lower surface of the electrode terminal, the nut including a female screw hole provided to correspond to the hole of the electrode terminal. A male screw member includes screw threads. The male screw member includes a small-diameter portion engaging threadedly with the female screw hole of the nut and a large-diameter portion having a diameter greater than the small diameter portion, the male screw member mounted penetratingly through the hole of the electrode terminal and engaging threadedly with the female screw hole so that the male screw member is restricted at a position where a lower end of the large-diameter portion abuts against an upper surface of the nut at a side of the small-diameter portion while projecting from an upper surface of the electrode terminal at a side of the large-diameter portion. The electrode plate for external connection is electrically connected with the electrode terminal on the outer surface of the case by placing the electrode plate so that the large-diameter portion of the male screw member passes through the hole of the electrode plate, and then engaging a nut with the large-diameter portion of the male screw member. Independent Claim 9 recites an electrode terminal connected with an electric power semiconductor device which is resin sealed inside of a case at one end while having a hole and exposed along a side of an outer

surface of the case at the other end. An electrode plate for external connection has a hole and is arranged to overlie the electrode terminal on the outer surface of the case. A nut is embedded in the outer surface of the case and located adjacent to a lower surface of the electrode terminal, the nut including a female screw hole provided to correspond to the hole of the electrode terminal. A male screw member includes a first portion having screw threads engaging threadedly with the female screw hole of the nut, a second portion including screw threads, and a discontinuous portion not including screw threads between the first and second portions at a middle portion of the male screw member, the male screw member mounted penetratingly through the hole of the electrode terminal and engaging threadedly with the female screw hole so that the male screw member is restricted at a position where the discontinuous portion is disposed adjacent an upper end of the female screw hole of the nut while projecting from an upper surface of the electrode terminal at a side of the second portion. The electrode plate for external connection is electrically connected with the electrode terminal on the outer surface of the case by placing the electrode plate so that the second portion of the male screw member passes through the hole of the electrode plate, and then engaging a nut with the second portion of the male screw member.

Regarding amended independent Claim 1, Masumoto is directed to a semiconductor device. Applicants respectfully assert that Masumoto does not teach or suggest, however, the claimed features of a small-diameter portion of a male screw member engaging threadedly with a female screw hole of a nut embedded in a case and a lower end of a large-diameter portion of the male screw member abutting against the nut to pass through a hole in an electrode plate, as recited in the independent claim.

Specifically, independent Claim 1 recites “a nut embedded in the outer surface of the case . . . , the nut comprising a female screw hole . . . and a male screw member comprising . . . a small-diameter portion engaging threadedly with the female screw hole of the nut and a

large-diameter portion . . . , the male screw member . . . engaging threadedly with the female screw hole so that the male screw member is restricted at a position where a lower end of the large-diameter portion abuts against an upper surface of the nut.”

The Office Action relies on the Admitted Prior Art and Arita in an attempt to remedy the deficiencies of Masumoto. Applicants respectfully assert that neither of the Admitted Prior Art nor Arita remedies these deficiencies, however, as neither the Admitted Prior Art or Arita teaches or suggests the claimed features of a small-diameter portion of a male screw member engaging threadedly with a female screw hole of a nut embedded in a case and a lower end of a large-diameter portion of the male screw member abutting against the nut to pass through a hole in an electrode plate, as recited in independent Claim 1.

Applicants respectfully assert that the claimed features recited in independent Claim 1 provide numerous advantages. Specifically, Applicants respectfully assert that the claimed features can provide a power semiconductor module in which an electrode plate is easily positioned with respect to an electrode terminal, and capable of realizing efficient assembling operation.² More specifically, the claimed features recited in independent Claim 1 can provide a module in which a center axis of an insertion hole of the electrode plate coincides with a center axis of an insertion hole of the electrode terminal, such that it is unnecessary to hold the electrode plate during fastening, and therefore a time required for electrically connecting both the members can be shortened.³ Further, because the large-diameter portion of the male screw member abuts against the nut, the male screw member can be precisely positioned, including in a vertical direction.

Thus, for the reasons discussed in detail above, Applicants respectfully assert that none of Masumoto, the Admitted Prior Art, and Arita, whether taken alone or in combination, teaches or suggests the claimed features recited in independent Claim 1. Therefore,

² Page 3, lines 7-15, of Applicants’ originally filed application.

³ From page 10, line 20 to page 11, line 11, of Applicant’s originally filed application.

Applicants respectfully request that the rejection of independent Claim 1 under 35 U.S.C. § 103(a) be withdrawn, and the allowance of independent Claim 1.

For reasons similar to those discussed above with respect to independent Claim 1, Applicants respectfully assert that independent Claim 9 is allowable. Specifically, Applicants respectfully assert that none of the references of record teach or suggest the claimed features of a first portion of a male screw member engaging threadedly with a female screw hole of a nut and a discontinuous portion of the male screw member, which does not include screw threads, disposed adjacent the nut to pass through a hole in an electrode plate, as recited in independent Claim 9. Specifically, independent Claim 9 recites “a nut embedded in the outer surface of the case . . . , the nut comprising a female screw hole provided to correspond to the hole of the electrode terminal . . . and a male screw member comprising a first portion including screw threads engaging threadedly with the female screw hole of the nut . . . and a discontinuous portion not including screw threads . . . , the male screw member . . . engaging threadedly with the female screw hole so that the male screw member is restricted at a position where the discontinuous portion is disposed adjacent an upper end of the female screw hole of the nut.” Therefore, Applicants respectfully request that the allowance of independent Claim 9.

Applicants respectfully assert that dependent Claims 8 and 10 are allowable for the same reasons as the independent claims from which they depend, as well as for their own features. Thus, Applicants respectfully request that the rejection of dependent Claim 8 under 35 U.S.C. § 103(a) be withdrawn, and the allowance of dependent Claims 8 and 10.

Consequently, in view of the present amendment, no further issues are believed to be outstanding in the present application, and the present application is believed to be in condition for formal Allowance. A Notice of Allowance for Claims 1 and 8-10 is earnestly solicited.

Application No. 09/828,947
Reply to Office Action of March 26, 2004

Should the Examiner deem that any further action is necessary to place this application in even better form for allowance, the Examiner is encouraged to contact the undersigned representative at the below listed telephone number.

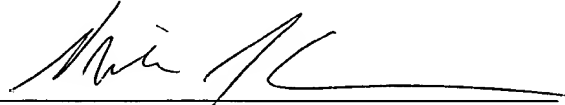
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